

PA SUMMARY USER GUIDE

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Precision Approach (PA) Summary

WAAS Web Application

Overview of Precision Approach (PA) Summary

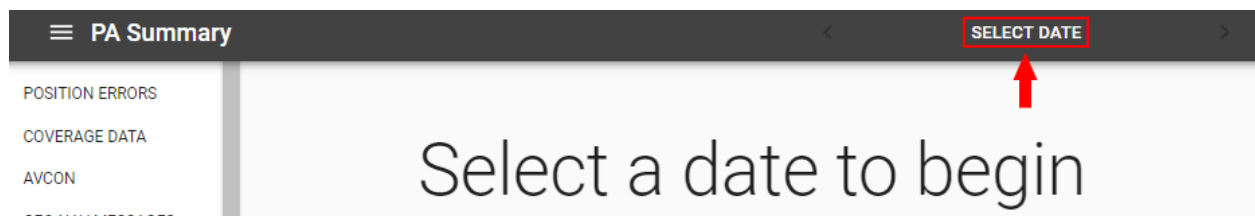
As part of the William J. Hughes Technical Center WAAS Test Team website (www.nstb.tc.faa.gov), the WAAS Web Application Portal allows you to view The Precision Approach (PA) Summary. The PA Summary portion of this website allows you to:

- View all PA statistics for any dates you choose (up to 4 years in the past)
- View position errors, LPV and LPV200, AvCon failures, missed Geo navigation messages, IGP alerts and GUS alerts, glitch events, SQM alert trips and jumps, satellite PA availability, ionospheric errors, data outages, the OEI network, PA position errors, UDREIs, and the KP index

The PA Summary web application can be found at [this link](#) or by navigating to the [NSTB site](#) and following the “PA Summary” link under the “Web Tools” section in the sidebar.

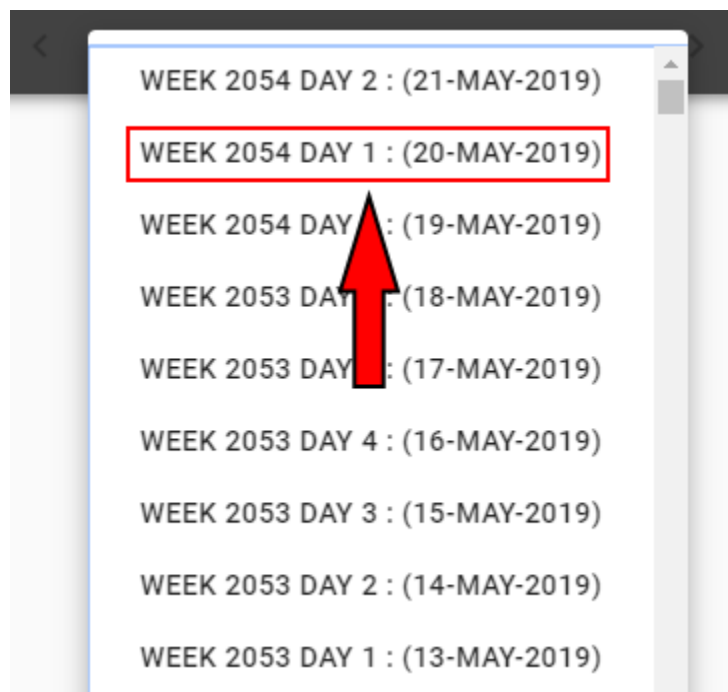
Bringing Up a Daily Summary

To use the PA Summary the first step is to select a date.



Clicking the highlighted button will reveal a drop-down menu of dates. When the user has clicked on a link, the application will load all relevant data for the selected date.

Once you choose a date, the following screen will appear. In this case, we chose Week 2054 Day 1: (20-May-2019). This means it is from a Tuesday 2054 weeks since the GPS epoch (See the red arrow).



PA Summary Sections

Position Errors

The first section is the Position Errors section (See green box below). Position Errors show receiver specific errors. These are errors in with the position solution tool is in PA mode. PA mode is defined as all the corrections being processed regardless of protection level. The position solution tool is used to calculate the horizontal and vertical errors for each receiver location. National Satellite Test Bed (NSTB) and WAAS reference station receivers are included in the position errors section in separate tables. For the WAAS receivers, position errors are calculated for all three receivers at the site but only one of those receivers is shown.

In the first box, we are seeing the Statistic followed by the Vertical and Horizontal Statistic. These errors are given in meters. The Maximum Ratio row shows the largest ratio of the vertical or horizontal error to the vertical or horizontal protection level

Statistic	Vertical	Horizontal
95% Maximum Error	Atlantic City (1.978)	Atlantic City (1.195)
95% Minimum Error	Salt Lake City (0.673)	Dallas (0.386)
Maximum Error	Atlantic City (3.383)	Gander (2.076)
Maximum Ratio	Cleveland (0.171)	Atlantic City (0.156)

The second and third tables in the Position Errors section shows us all of the receivers including the receiver hex ID, Location, Horizontal Max (HPL), Horizontal Ratio (Horz Ratio), Vertical Max (VPL) and Vertical Ratio (Vert Ratio). The orange highlighted boxes are exceeding thresholds (See red arrow below). The ID is the hex representation of the receiver number. The receiver number (RCVR) is a number used to uniquely identify each receiver. The receiver number can be seen by hovering over the hex ID. The Horz or Vert Max (HPL or VPL) column shows the horizontal or vertical position error and the HPL or VPL at that time in parentheses. The Horz or Vert Ratio column shows the ratio of the position error to the protection level. By default, the maximum error and ratio for the day are shown. However, you can see the 95%, 99%, 99.99%, mean, or standard deviation by clicking the appropriate button.

Receiver Errors											
Highlighted Are Exceeding Thresholds: Horizontal-3m; Vertical-4m; Ratio-0.2m											
<div>POSITION 95% POSITION 99% POSITION 99.99% POSITION MAX POSITION MEAN POSITION STD. DEV</div>											
WAAS Position Errors											
HEX ID	City	HMax (m)	HPL (m)	HMax TOW (GMT)	HRatio	HRatio TOW (GMT)	VMax (m)	VPL (m)	VMax TOW (GMT)	VRatio	VRatio TOW (GMT)
6AC1	Billings	1.10	9.39	114773 (07:52:35)	0.118	114773 (07:52:35)	1.35	19.31	97277 (03:00:59)	0.078	114474 (07:47:36)
6BC1	Albuquerque	1.22	12.88	87419 (00:16:41)	0.117	99527 (03:38:29)	2.11	21.27	88783 (00:39:25)	0.125	96395 (02:46:17)
6CC1	Anchorage	0.95	11.24	93964 (02:05:46)	0.084	93964 (02:05:46)	2.19	18.08	155840 (19:17:02)	0.136	157651 (19:47:13)
6DC1	Chicago	1.40	12.88	91500 (01:24:42)	0.118	115427 (08:03:29)	1.79	18.09	91788 (01:29:30)	0.131	111564 (06:59:06)

Coverage Data

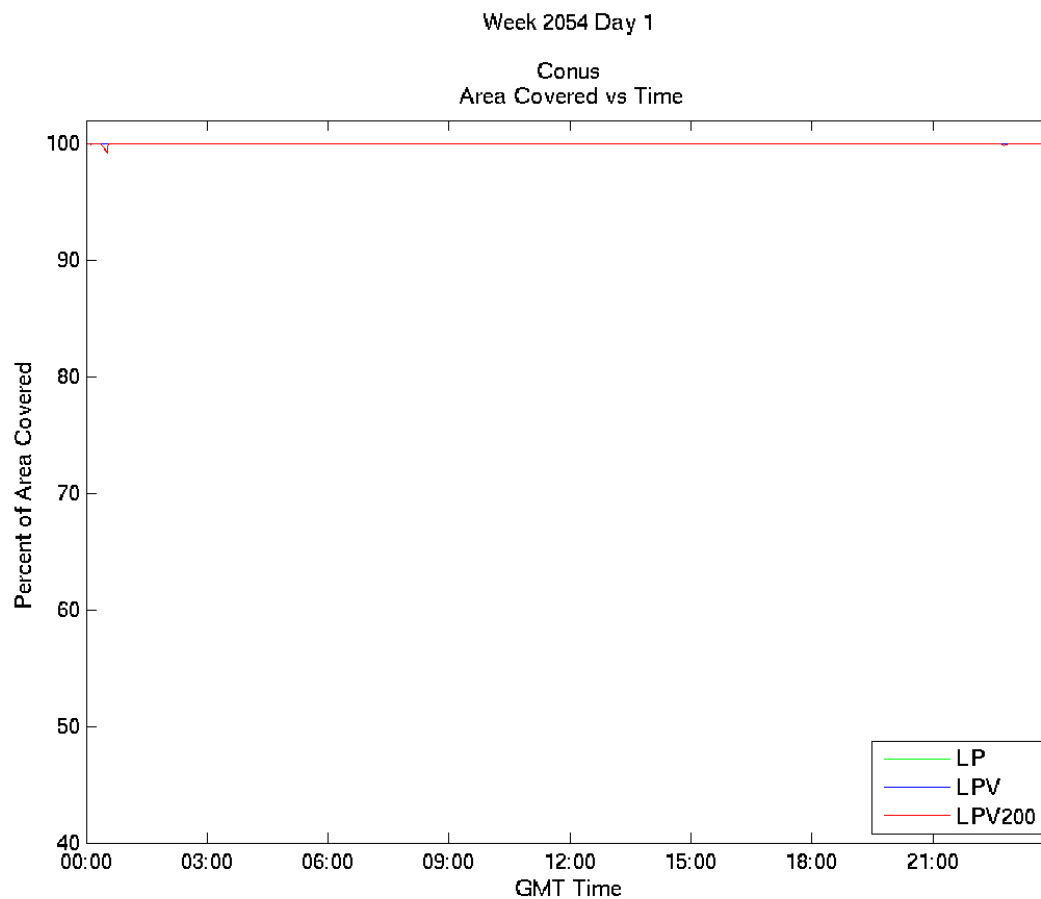
The Coverage Data section provides the LPV and LPV200 coverage maps for the selected day. Coverage areas are divided into three regions:

- Alaska – outlined by the yellow line
- The Contiguous United States (CONUS) – is also outlined in yellow
- Canada – outlined in blue

The first figure is a table displaying the 99% coverage statistics for LPV and LPV200.

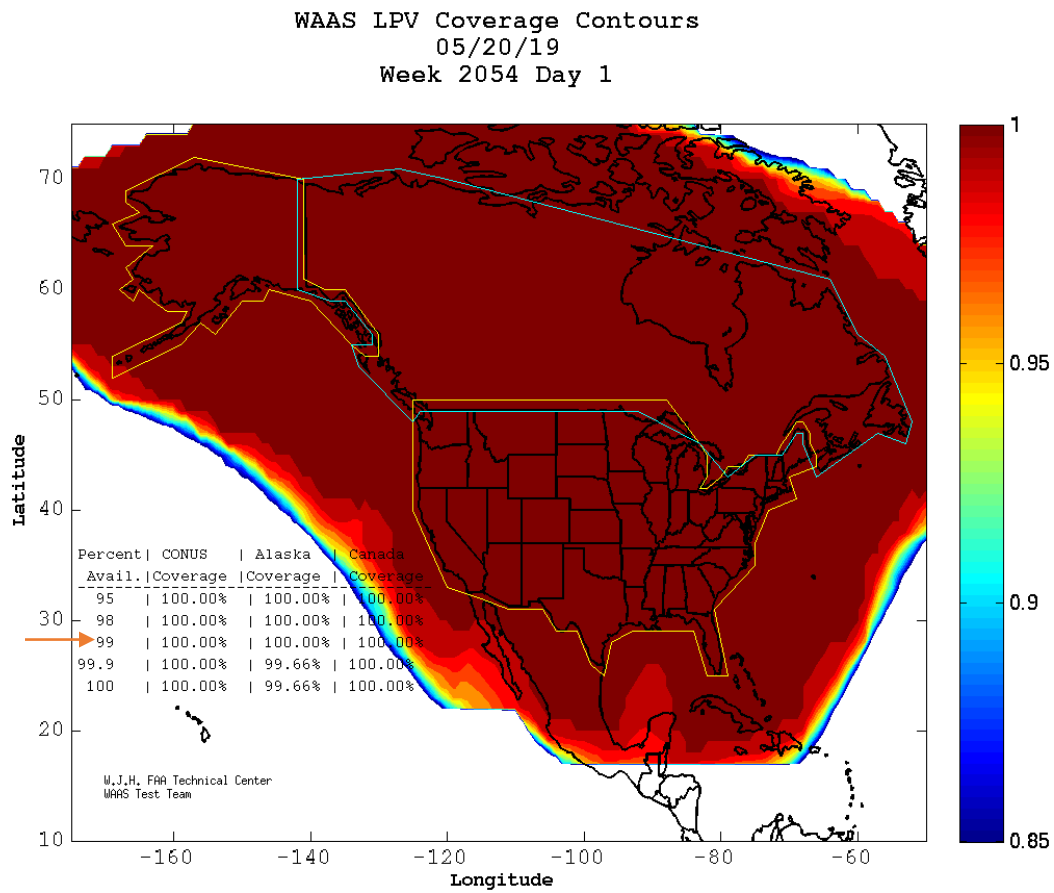
Service Level	CONUS	ALASKA	CANADA
LPV	100.00	100.00	100.00
LPV200	100.00	97.82	100.00

A user can click on the blue links in the table header to view a coverage vs. time plot for the indicated region.



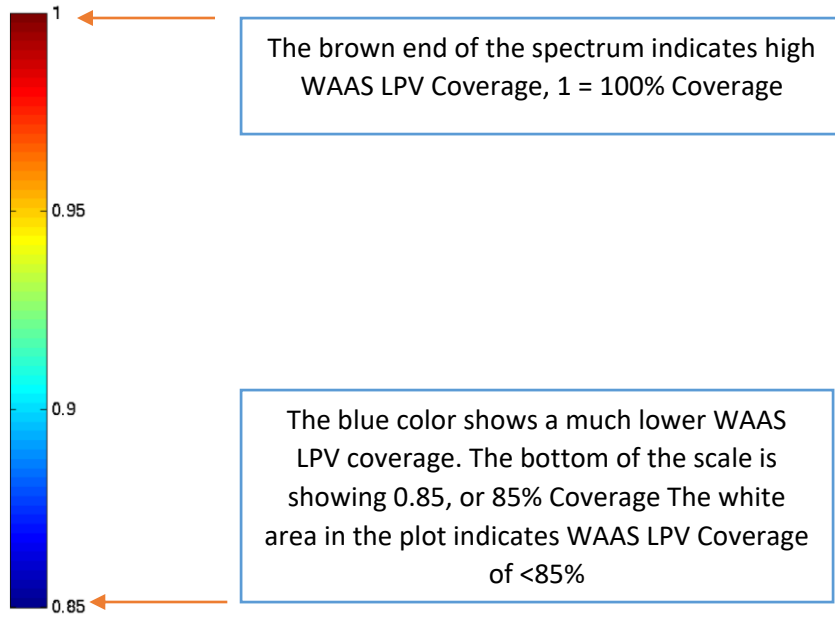
The LPV coverage for North America is divided into percentage by region. The HPL and VPL is calculated at a 1-degree grid spacing to determine if WAAS LPV service is available at each of these grid points. Adding up the availability of each grid point over a 24-hour period in a region determines the availability of WAAS LPV service in that region. In the table within the diagram, notice the third line. This has the

same information as the first table in the section. WAAS LPV was available 99% of the time in 100% of the area covered in CONUS, Alaska, and Canada (See red arrow below).



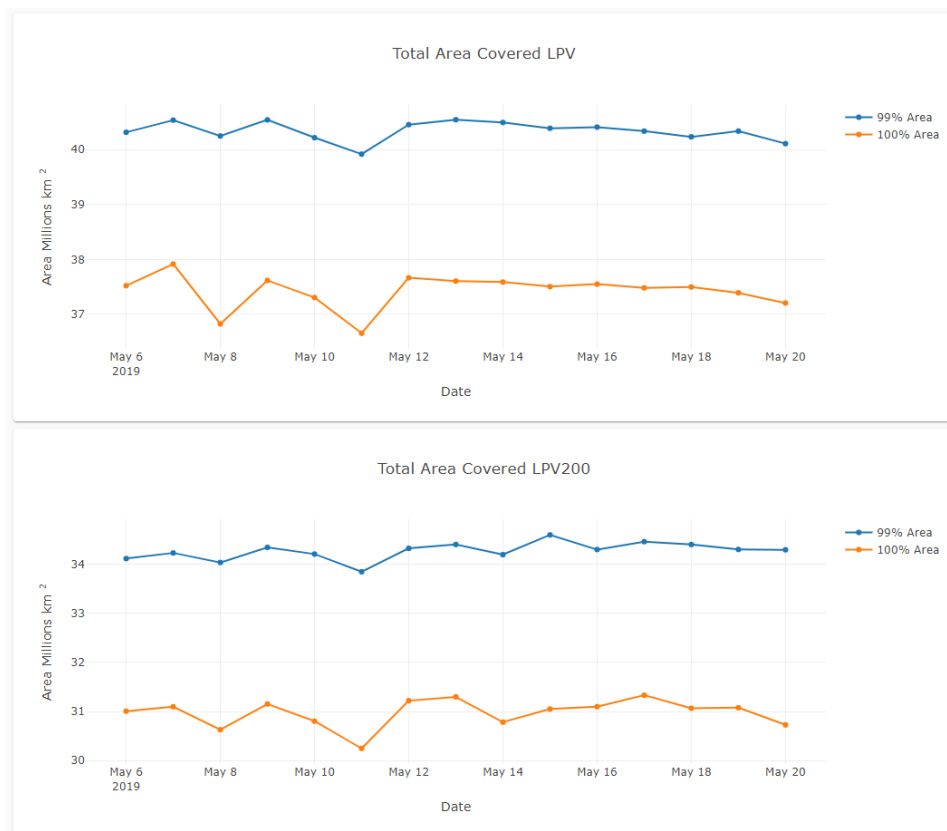
The LPV Color Scale

The color scale show the percent of WAAS LPV Coverage.



Total Area Covered

Total Area Covered shows the Total Area covered for LPV and LPV 200. The total area covered is shown in square kilometers and includes the CONUS, Alaska, and Canada regions. The blue line indicates the number of square kilometers covered with 99% availability and the yellow line shows the number of square kilometers covered with 100% availability.





By default, the page will show up to 14 days before the selected date. The user can change these parameters using the Start and End date Inputs and clicking "SUBMIT".

START DATE	END DATE	SUBMIT
01-Aug-2021	18-Aug-2021	

AvCon

The next section is the Availability and Continuity, or AvCon, section. AvCon is receiver availability taking into account the continuity of actual outages. This page shows tables for both LPV AvCon and LPV200 AvCon. LPV must have a **VPL < 50 meters and the HPL < 40 meters**, while LPV200 must have a **VPL < 35 meters and the HPL < 40 meters horizontal**.

LPV AvCon 			LPV200 AvCon 		
City	Outages	AvCon	City	Outages	AvCon
Merida	1 : 1	0.9906 : 0.9900	Barrow	1 : 1	0.9889 : 0.9787
Mexico City	1 : 1	0.9949 : 0.9923	Merida	2 : 2	0.9776 : 0.9733
San Jose Del Cabo	1 : 1	0.9900 : 0.9899	Mexico City	2 : 3	0.9845 : 0.9667
San Juan	9 : 10	0.7810 : 0.7501	Puerto Vallarta	2 : 2	0.9764 : 0.9481
Tapachula	3 : 5	0.0284 : 0.0342	San Jose Del Cabo	2 : 2	0.9871 : 0.9716


The AvCon tables (above) summarize the outages, outage threshold, AvCon statistic, and AvCon threshold. Receivers that exceeded the threshold are highlighted in yellow. These thresholds are computed every 30 days to reflect dynamic variables for each receiver, such as GPS constellation changes or changes to the WAAS. When analyzing data for a particular day, the receiver will be compared to the threshold for the time period of the selected day only.

The outage tables (below) show each individual receiver AvCon outage.

LPV AvCon Times 			
City	Start Time	End Time	Duration
Honolulu	86400 (23:59:42)	172799 (23:59:41)	86400
Merida	91665 (01:27:27)	92329 (01:38:31)	665
Mexico City	88683 (00:37:45)	88972 (00:42:34)	290
San Jose Del Cabo	87311 (00:14:53)	88017 (00:26:39)	707
San Juan	86490 (00:01:12)	86533 (00:01:55)	44
San Juan	90902 (01:14:44)	96946 (02:55:28)	6045
San Juan	97853 (03:10:35)	98646 (03:23:48)	794
San Juan	103700 (04:48:02)	105084 (05:11:06)	1385
San Juan	107147 (05:45:29)	107901 (05:58:03)	755
San Juan	138375 (14:25:57)	139914 (14:51:36)	1540

GEO Nav Messages


The GEO Nav message section provides a table that lists any missed messages from the GEOs in service. Typically, there are three GEOs in service on a given date with a PRN of 131, 133, 135, or 138. We receive messages from these receivers every second. The Time Out and Time In is given in GPS Time of Week (GPS TOW) and GMT Time in parenthesis. The number of missed seconds, number of transmitted message type 0's, the time back to PA Mode, seconds not in PA mode and a description is given for each missed message. PA Mode refers to a state in which a user would be able to conduct a Precision Approach. Note: Usually when 4 or 5 seconds are missed, it is due to a manual switchover. A number over 10 seconds normally means the GUS, or uplink station, faulted.

Missed Nav Messages							
GEO	Time Out	Time In	Seconds Missed	Type 0 Followed	Time Back to PA Mode	Seconds Not in PA	Description
133	325620 (18:26:42)	328437 (19:13:39)	2816	0	335933 (21:18:35)	7496	
133	341447 (22:50:29)	345599 (23:59:41)	4152	0	0 (23:59:42)	0	


Subsystem Alerts

The SubSystem Alert section shows the same information as Alert Explorer.


The GUS Alerts listed in the table show the Geostationary satellite number(s) and name; the time of week the alert started and ended along with the duration in seconds. A description of the alerts is also included.

GUS Alerts								
GEO	Long Name	Short Name	Start TOW	End TOW	Duration	Previous Mode	Alert Mode	End Mode
133	Brewster	BR1	325621 (18:26:43)	326071 (18:34:13)	451	PRIMARY	FAULTED	MAINTENANCE
133	Brewster	BR1	326072 (18:34:14)	326884 (18:47:46)	813	FAULTED	MAINTENANCE	FAULTED
133	Brewster	BR1	326885 (18:47:47)	326886 (18:47:48)	2	MAINTENANCE	FAULTED	OFFLINE
133	Brewster	BR1	326887 (18:47:49)	327524 (18:58:26)	638	FAULTED	OFFLINE	MAINTENANCE
133	Brewster	BR1	327525 (18:58:27)	328112 (19:08:14)	588	OFFLINE	MAINTENANCE	VERIFICATION
133	Brewster	BR1	328113 (19:08:15)	328426 (19:13:28)	314	MAINTENANCE	VERIFICATION	BACKUP
133	Brewster	BR1	341448 (22:50:30)	341848 (22:57:10)	401	PRIMARY	FAULTED	MAINTENANCE
133	Brewster	BR1	341849 (22:57:11)	null (23:59:42)		FAULTED	MAINTENANCE	


IGP alerts refer to when certain IGP's go to 45 meters. The IGP's chosen are those in the CONUS and Alaska regions.

IGP Alerts							
GEO	Start TOW	End TOW	Duration	LAT	LON	Previous GIVEi	Alert GIVEi
No IGP Alerts							

Selected Source alerts refer to when the C&V selected source of a GUS is changed.

Selected Source Alerts							
GEO	GUS Short	GUS Long	Start TOW	End TOW	Duration	Previous Site	Current Site
133	BR1	Brewster	340790 (22:39:32)	340790 (22:39:32)	1	Atlanta	Los Angeles

CnV alerts refer to when one of the C&Vs changes mode. IGP, Selected Source, and CnV alerts are rare.

C&V Alerts						
Site Name	Start TOW	End TOW	Duration	Previous Mode	Alert Mode	
No C&V Alerts						


SV/T6 Alerts


Originating from Geostationary satellites, SV alerts inform us when a satellite's User Differential Range Error (UDREI) is changing and WAAS transmits at least 4 consecutive messages to ensure a user received the alert. The Geostationary satellites 131, 133, 135 and 138 are listed separately in the tables below.


The columns include: the PRN number that shows which satellite the alert refers to; the time in GPS Time of Week (GPS TOW) and GMT Time in parenthesis; the number of seconds it took to get back into PA mode; the number of seconds not in PA mode; the UDREI change (previous-current); the message type and # of messages received in a row; the time the UDREI for the noted satellite was last in PA mode in GPS TOW, and the severity of the glitch. Glitches are defined in the Glitch Events tab.

In the UDREI column, if the number is 12 or 13, the satellite is in NPA mode only. If the UDREI is >13, satellite is in the Not Monitored or Do Not Use (DNU) state. A number <12 indicates a satellite is in PA mode.

SV/T6 ALERTS

GEO 131								
Sat	Time Out	Time In	Missed Seconds	Previous UDREI	Alert UDREI	Msg Type / # of Msgs	Time of Prev UDREI	Severity
28	459484 (07:37:46)	0 (23:59:42)	0	14	15	4/4	459481 (07:37:43)	
28	513274 (22:34:16)	0 (23:59:42)	0	14	15	4/4	513271 (22:34:13)	

GEO 133								
Sat	Time Out	Time In	Missed Seconds	Previous UDREI	Alert UDREI	Msg Type / # of Msgs	Time of Prev UDREI	Severity
28	459484 (07:37:46)	0 (23:59:42)	0	14	15	4/4	459481 (07:37:43)	
28	513274 (22:34:16)	0 (23:59:42)	0	14	15	4/4	513271 (22:34:13)	

GEO 138								
Sat	Time Out	Time In	Missed Seconds	Previous UDREI	Alert UDREI	Msg Type / # of Msgs	Time of Prev UDREI	Severity
28	459484 (07:37:46)	0 (23:59:42)	0	14	15	4/4	459481 (07:37:43)	
28	513274 (22:34:16)	0 (23:59:42)	0	14	15	4/4	513271 (22:34:13)	

SV Glitches

The SV Glitches section shows us specific satellites that exhibit abnormal operation, from the point of view of the WAAS reference station receivers. Below, PRN 2 had a glitch. The Glitch Severity key indicates which events caused the glitch. Glitch Severity ranges from 0-3, with 0 showing receiver tracking was limited due to > 14 satellites visible and 3 indicating more than just SQM was affected and all receivers lost track of a satellite. The reference to SQM is for a receiver that is not outputting SQM data but is outputting L1 and L2 data. The Glitch Stat Failure column shows the number of receivers that are not providing L1, L2, or SQM data out of how many receivers should be transmitting this data.

Glitch Events

Download

Sat	Stat Fail	Start	End	Geos Alerted	131 Time	131 UDREi	133 Time	133 UDREi	138 Time	138 UDREi	Comments
2	L1 - 10 of 29;L2 - 10 of 29;SQM - 10 of 29	474143 (11:42:05)	474266 (11:44:08)	NO ALERTS							

Glitch Details

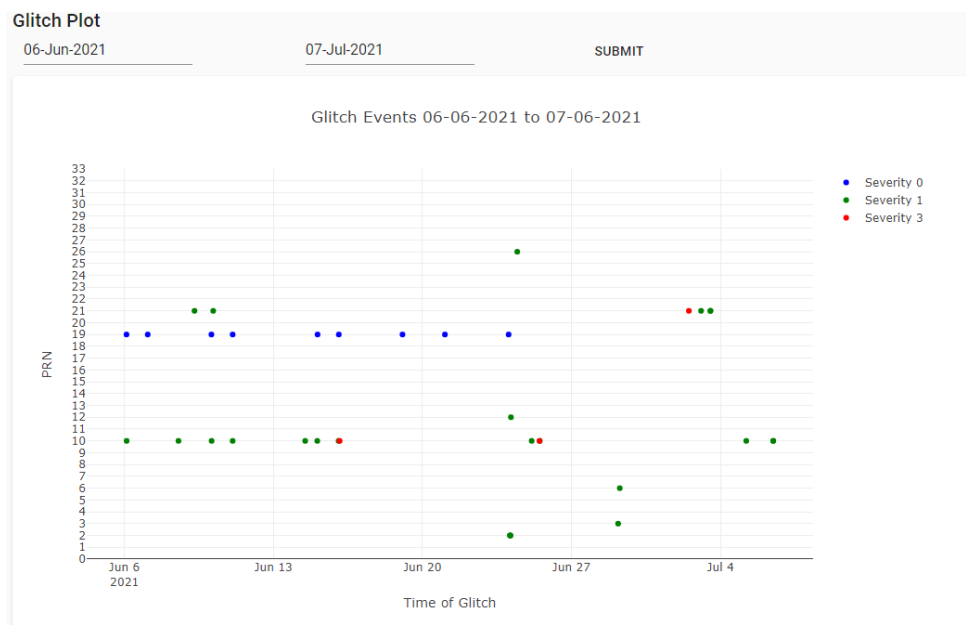
Download

Sat	Severity	Duration	Geos Alerted	UDREi Change
2	1	123	NO ALERTS	

To see the information in a graph, pick a Start and End date and click "SUBMIT".

Here we have a graph of the varying magnitude of glitches that occurred. Glitches are degradations in the signal that can cause WAAS receivers to lose track of the GPS signal. The dots indicate the severity of the glitch events. As the key code says on the top of the chart:


- Severity 1 = Green dots that indicate that a significant number of receivers- but not all receivers- lost track of the satellite.
- Severity 2 = Blue dots indicate that only Signal Quality Monitoring (SQM) was affected and all receivers lost track.
- Severity 3 = Red dots indicate more than just SQM was affected and all receivers lost track.




SQM Data

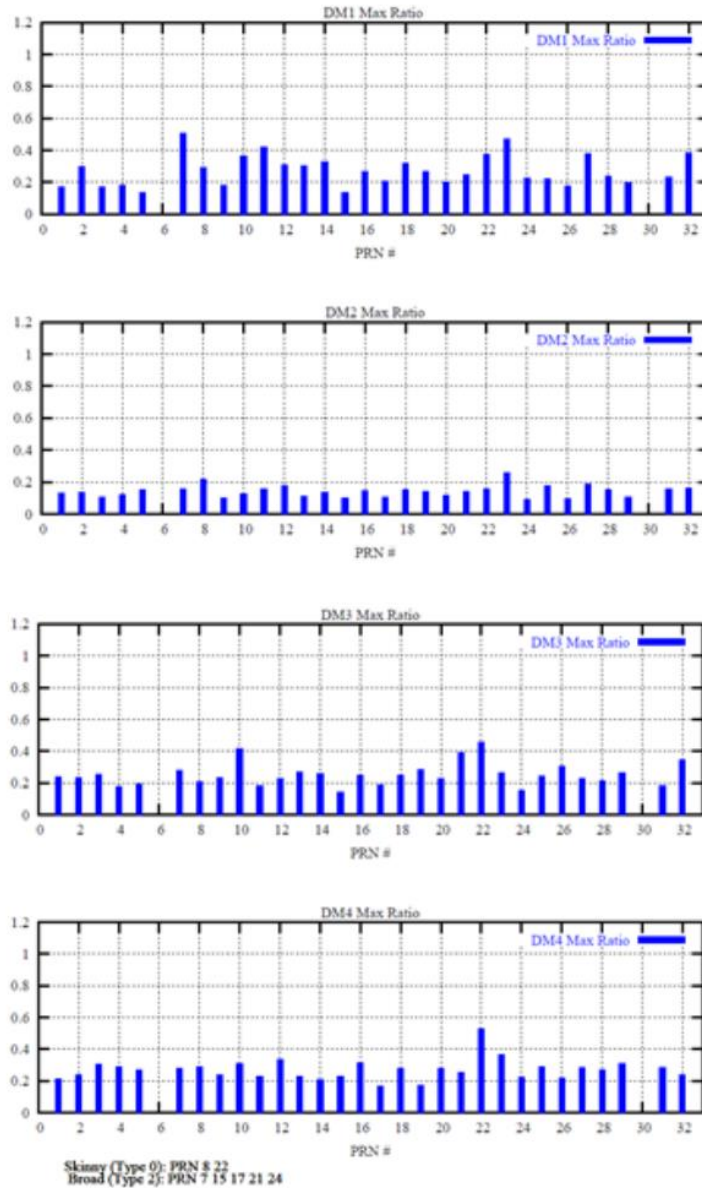
SQM Alerts show any anomalies in the GPS satellite signal. An SQM Alert Trip shows any trips of the reported by the Technical Center SQM tool. This rarely happens. A SQM Alert Jump shows when SQM increases but it is not necessarily a trip. Daily Max Trip Ratio shows the max ratio per satellite over a 24 hour period. PRN Bias Daily Average Trend shows the four-month trend. Both of those links show data from the Technical Center SQM tool, not the operational WAAS.

PRN BIAS TRENDS DAILY MAX TRIP RATIO

Trips						
Stats Date	Sat	DM	Max Ratio	Process Aborted		
No SQM Trips						

Jumps							
Stats Date	Sat	DM	Bias	Sat Thresh	Exceeded Thresh	Thresh Ratio	Ratio
No SQM Jumps							

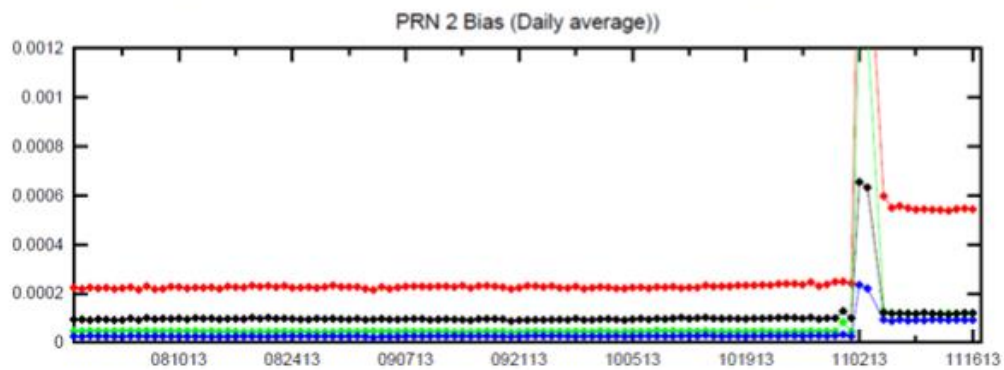
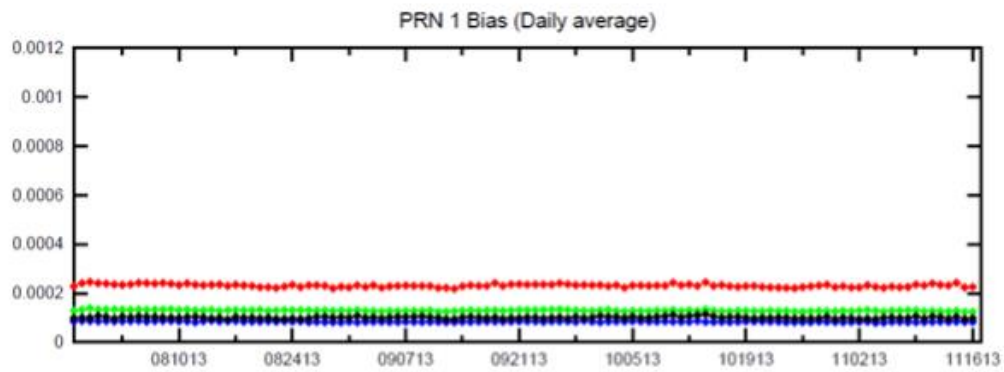
In SQM Alerts, when we press on Daily Max Trip Ratio (PRN Bias/Threshold Ratio Plot), we see the max ratio per satellite over a 24 hour period. PRN Bias is the overall estimated deformation per satellite across receivers. The Max Trip Ratio combines information from the satellite together and computes a threshold. The Ratio of PRN Bias ÷ the threshold should be < 1. Below are the four detection matrix (DM) graphs that determine the SQM in all 4 metrics.



In SQM Alerts, when we press on PRN Bias Daily Average Trend, a PDF of PRN Bias opens showing a 4-month trend per satellite. While the diagrams below depict only information from PRN 1 and PRN 2, in actuality the pdf shows info for all 32 satellites in the WAAS system. The X axis indicates the date while the Y axis shows the daily average of the PRN Bias.


The 4 different Detection Matrices (DM) are shown using different colors:

- Red = DM1
- Green = DM2
- Blue = DM3
- Black = DM4




Range Errors and PA Availability


The first table in this section shows satellite unboundings. These are specific per satellite per receiver. Unboundings occur when the UDRE does not bound the satellite range error.

Range Unboundings			
City	Sat	Range Count	
San Juan	32	24	

The PA Availability table shows the percentage availability of a satellite based on its expected UDREi.


PA Availability				
Availability	131	133	138	
100	1; 4; 6; 7; 8; 12; 13; 17; 19; 20; 22; 27; 29; 30; 31; 131; 133; 138	1; 4; 6; 7; 8; 12; 13; 17; 19; 20; 22; 27; 29; 30; 31; 131; 133; 138	1; 4; 6; 7; 8; 12; 13; 17; 19; 20; 22; 27; 29; 30; 31; 131; 133; 138	
99.5	3; 5; 9; 10; 14; 15; 16; 18; 21; 25; 26; 32	3; 5; 9; 10; 14; 15; 16; 18; 21; 25; 26; 32	3; 5; 9; 10; 14; 15; 16; 18; 21; 25; 26; 32	
99	23; 24	23; 24	23; 24	
98.5	2	2	2	
0	11; 28	11; 28	11; 28	

The range errors table shows the max range error for each receiver/satellite pair. The highlighted box shows the maximum range error for each receiver.

Range Errors																																							
																																						NPA	
CITY	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31	S32	S131	S133	S138	S131	S133	S138	
Albuquerque	2.05	1.03	1.30	1.32	1.16	1.32	1.10	2.46	1.49	1.19		1.72	1.45	1.71	2.63	1.61	1.18	1.21	2.05	2.03	3.41	1.08	1.14	0.95	1.55	3.22	3.01		1.14	2.30	1.23	1.25	2.58	2.58	1.59				
Anchorage	0.98	1.55	2.66	2.94	1.69	2.41	1.84	2.55	2.37	3.14		2.34	3.01	2.63	2.07	1.50	1.65	3.49	1.14	1.22	2.38	1.57	2.97	3.12	1.73	1.65	2.37		2.15	1.72	4.52	1.78	2.31	2.26	3.61				
Atlanta	1.54	1.23	1.98	1.10	0.78	1.05	1.16	1.13	1.40	0.97		1.80	0.91	1.71	0.71	1.17	1.02	0.83	1.21	1.42	1.32	1.29	0.83	1.49	1.50	1.17	0.94		1.03	1.13	0.91	1.32	1.66	1.69	1.70				
Barrow	1.72	1.71	1.47	1.55	1.39	1.70	2.27	1.28	1.45	1.61		1.04	1.75	2.21	1.56	2.55	1.97	4.29	1.24	1.56	1.55	2.53	2.52	1.61	1.28	1.37	2.20		1.30	2.21	1.26	1.06	2.62	2.06					
Bethel	1.13	1.78	1.14	1.97	2.05	1.26	2.05	1.14	1.60	1.71		1.63	1.76	1.80	1.50	2.63	2.09	1.36	1.75	1.68	1.57	1.36	2.60	1.51	1.75	1.50	1.49		1.75	1.69	1.61	1.33	2.53	2.52	2.26				
Billings	1.37	1.80	1.12	1.13	1.51	2.12	1.95	1.01	1.32	2.81		2.81	1.34	1.56	1.58	1.92	1.59	1.71	1.66	1.97	1.78	1.66	1.97	1.41	2.99	1.99	1.27		1.28	1.30	2.29	1.48	2.87	1.96	1.56				
Boston	1.98	2.18	3.79	2.28	1.31	1.65	1.90	1.27	1.49	1.70		2.01	1.37	2.15	0.72	1.20	2.40	2.02	1.12	2.36	2.11	1.72	0.96	1.53	1.73	2.42	2.17		1.13	2.81	1.50	1.17	2.06	1.69	1.71				


Iono Errors


The Iono Errors section shows the ionospheric component of the range error. The satellites are listed in the first column. The other columns are the ionospheric errors in meters for the noted receivers. The highest ionospheric error of each receiver is highlighted.

Iono Errors																											
SAT	BIL	ZAB	ZBW	ZDC	ZHU	ZKC	ZLA	ZLC	ZMA	ZMP	ZTL	JNU	BET	CDB	MMD	ZAU	ZFW	ZME	ZNY	ZOA	OTZ	MMX	MSD	YQX	YYR	MTP	YFB
1	0.34	0.43	0.46	0.20	0.32	0.61	0.41	0.37	0.42	0.36	0.45	0.91	0.21	0.42	0.23	0.68	0.33	0.39	0.48	0.30	0.39	0.43	0.54	0.59	0.26		0.20
2	0.61	0.33	0.51	0.34	0.49	0.23	0.45	0.26	0.64	0.45	0.29	0.39	0.48	0.46	0.55	0.40	0.41	0.41	0.40	0.65	0.25	0.44	0.41	0.87	0.39		0.24
3	0.20	0.43	0.81	0.44	0.69	0.55	0.54	0.45	0.56	0.29	0.81	0.36	0.22	0.48	0.59	0.34	0.53	0.66	0.33	0.35	0.67	0.50	0.42	0.68	0.37		0.42
4	0.33	0.43	0.49	0.54	0.39	0.32	0.36	0.30	0.35	0.35	0.35	0.29	0.19	0.32	0.45	0.37	0.56	0.28	0.37	0.38	0.33	0.52	0.48	0.40	0.19		0.47
5	0.40	0.30	0.54	0.30	0.52	0.43	0.39	0.37	1.12	0.27	0.19	0.55	0.24	0.54	0.63	0.41	0.36	0.38	0.45	0.35	0.31	0.42	0.33	0.43	0.16		0.39
6	0.77	0.59	0.45	0.28	0.58	0.64	0.48	0.41	0.34	0.37	0.28	0.31	0.42	0.53	0.32	0.74	0.27	0.41	0.33	0.80	0.50	0.53	0.34	0.38	0.26		0.32
7	0.55	0.29	0.43	0.45	0.37	0.47	0.31	0.70	0.60	0.44	0.43	0.49	0.22	0.37	0.38	0.33	0.36	0.32	0.31	0.21	0.57	0.48	0.41	0.39	0.22		0.84
8	0.21	0.50	0.43	0.31	0.87	0.40	0.83	0.23	0.31	0.91	0.28	0.41	0.40	0.44	0.43	0.42	0.40	0.39	0.32	0.48	0.54	0.49	0.26	0.12	0.43		0.41

Data Outages

The Data Outages section shows the number of seconds we did not receive data for a particular receiver. The top box shows the outage totals while the bottom box shows the times for each outage. Only outages >3 seconds are recorded in the bottom box. The bottom box also shows the Time Out and Time In in GPS Time of Week (GPS TOW) and GMT Time in parenthesis. The tables are separated by WAAS receivers and NSTB receivers.

WAAS Outage Summary			
City	Outage Count	Seconds Missed	
Cold Bay	3	3	
Merida	13	1577	
Puerto Vallarta	6	7	
Goose Bay	1	1	
Tapachula	1	86400	
San Jose Del Cabo	6	1600	


WAAS Sites				
City	Time Out	Time In	Seconds Missed	
Merida	432000 (23:59:42)	432060 (00:00:42)	60	
Merida	432553 (00:08:55)	434051 (00:33:53)	1497	
Merida	450295 (05:04:37)	450304 (05:04:46)	8	
San Jose Del Cabo	454310 (06:11:32)	455758 (06:35:40)	1447	
San Jose Del Cabo	466527 (09:35:09)	466556 (09:35:38)	28	
San Jose Del Cabo	466865 (09:40:47)	466988 (09:42:50)	122	
Tapachula	432000 (23:59:42)	518399 (23:59:41)	86400	

OEI Network

The diagram below shows a portion of the Operational External Interface (OEI) Network Screen. These show outages from receivers for ALL threads. The OEI server obtains identical information from 2 rings of data for each receiver:

- NET_RING1 shows how many seconds were missing on the Ring 1 network.
- NET_RING2 shows how many seconds were missing on Ring 2 network.
- NET_MISSING is a merged file showing seconds that were missing from both Ring 1 and Ring 2 at the same time.
- DC_MISSING is the number of seconds that data is missing for data collection. Both NET_MISSING and DC_MISSING should match.

The orange highlights anything that is missing data from that particular receiver or if the last 2 columns do not match.


Group 1 Merged Data 115						
Site	Net Ring 1	Net Ring 2	Net Missing	DC Missing		
Atlantic_	86400	86400	86400	86400		
wbetwrsp1	3	2	0	0		
wbetwrsp2	2	2	0	0		
wbetwrsp3	3	0	0	0		
wbilwrsp1	22	26	0	0		
wbilwrsp2	18	15	0	0		
wbilwrsp3	8	18	0	0		
wbrwrsp1	13	7	0	0		
wbrwrsp2	0	0	0	0		
wbrwrsp3	8	10	0	0		
wcdbwrsp1	86400	3	3	3		
wcdbwrsp2	86400	2	2	2		
wcdbwrsp3	86400	0	0	0		

PRN138 L1 SNR

Here is a partial screen shot of PRN138 L1 Signal to Noise Ratio (L1SNR) in decibels, as reported by the WAAS receiver. This section is meant to determine if the signal power received at various reference stations from the WAAS GEO 138 differs from a normal level. A significant difference could be an indication of Radio Frequency Interference (RFI). The first table lists receivers in the first column followed by the receiver's location, the signal to noise average, minimum and maximum columns.

Signal Noise Ratios					
RCVR	City	Avg	Min	Max	
27329	Billings	48.03	46.30	48.60	
27585	Albuquerque	49.96	48.00	50.60	
27841	Anchorage	40.86	38.60	42.00	
28097	Chicago	49.83	47.60	50.60	
28353	Boston	46.77	44.60	47.60	
28609	Washington DC	47.96	45.30	49.00	
28865	Denver	49.49	47.30	50.30	
29121	Dallas	51.08	49.00	52.00	
29633	Houston	50.69	48.60	51.60	
30145	Jacksonville	50.06	47.60	50.60	

The second table shows the drop in L1SNR. If the signal to noise drops > 6 db, the signal was possibly interrupted by RFI. The orange highlighted boxes show the minimum L1SNR > 9db subtracted from the average or the length of time exceeded 300 seconds. Note that when there is a GUS switchover for PRN 138 all the receivers that track that GEO will be listed in this table. GUS switchovers are listed in the Alert Explorer.

Signal Drops						
RCVR	City	Start Time	Stop Time	Duration	Biggest Dev.	
30401	Kansas City	335698 (21:14:40)	335708 (21:14:50)	10	38.60	
30657	Los Angeles	330658 (19:50:40)	330668 (19:50:50)	10	42.00	
31169	Miami	326118 (18:35:00)	326128 (18:35:10)	10	45.00	
33473	Juneau	338538 (22:02:00)	338548 (22:02:10)	10	37.30	

PA Position Errors

Unlike the Position Error tab which shows position errors when LPV service is available, the PA Position Errors tab shows the position errors when the receivers are out of LPV service. The table below shows Position errors when the HPL is > 40 meters and/or the VPL is > 50 meters. Errors are listed when the tool is in PA mode. Also, the 95%, 99%, 99.99%, maximum, mean, and standard deviation can be displayed by choosing the appropriate button.

Position errors in PA Mode (No service level required)

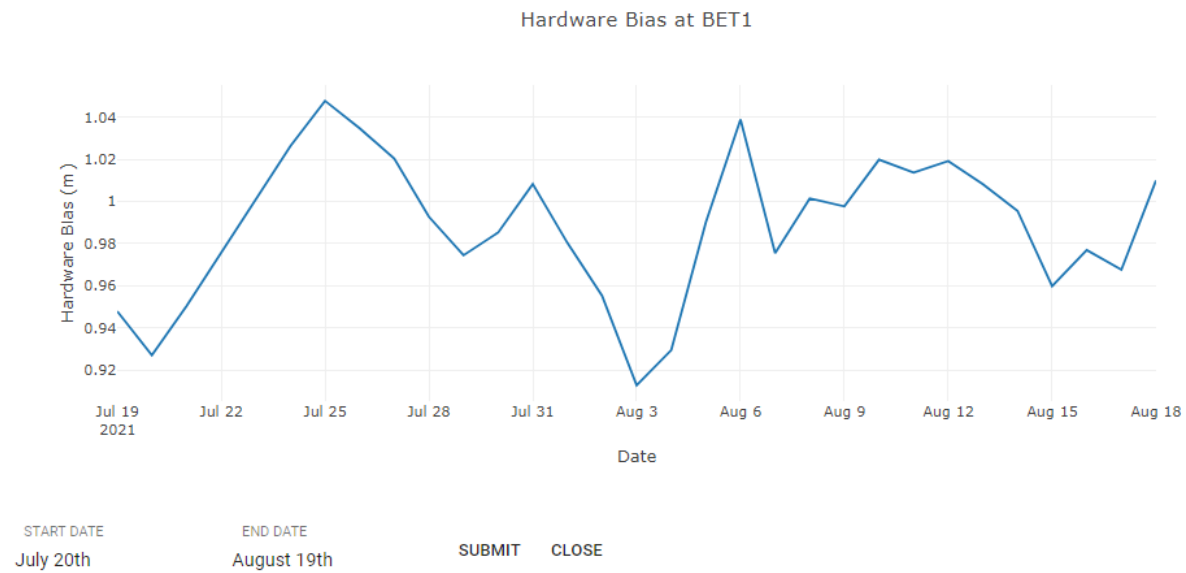
ID	City	HMax	HPL	VMax	VPL
277	1Atlantic City-G3B-L1L5	8.81	131.18	5.67	33.64
32963	San Juan	2.96	43.51	3.65	55.00
36545	Tapachula	3.94	106.62	3.27	77.13

Hardware Bias

The hardware bias section provides statistics of the error introduced by the receivers. The table provides the day's bias as well as the difference in bias from the previous day. The next columns provide a 30-day rollup of the median and max bias and differences.


RCVR HW Bias ↓							
Site	Today		Last 30 Days				STD DEV
	Bias (m)	Difference (m)	Median Bias (m)	Median Difference (m)	Max Bias (m)	Max Difference (m)	
BET1	0.9890	0.0385	0.9942	0.0227	1.0478	0.0763	0.0342
BET2	1.1015	0.0423	1.1130	0.0044	1.1776	0.0690	0.0434
BET3	2.7563	0.0917	2.7637	0.0667	2.8204	0.1234	0.0421
BIL1	2.5521	0.0256	2.5471	0.0121	2.5992	0.0642	0.0247
BIL2	2.3276	0.0410	2.3240	0.0261	2.3630	0.0129	0.0185
BIL3	1.3045	0.0368	1.2992	0.0809	1.3433	0.1250	0.0242
BRW1	1.3927	0.0900	1.3912	0.0304	1.4483	0.0267	0.0321

The receiver ID can be clicked to provide a daily trend plot. The date parameters can be adjusted.




Edits

These edits are entered manually when a receiver malfunctions. Below, the edit ID, start and stop time of week and comments are listed in the table, followed by the flag. You can view automatic edits by pressing the orange “View Automatic Edits” button at the bottom of the screen. Thresholds have been established in the evaluation software to determine when automatic editing (i.e. removal) of data should occur. The purpose of this website is to measure the performance of WAAS. When one of the tools (i.e. receivers) that is used to measure performance malfunctions the data from that tool is removed from the results. In the Flag column, a 0 means the edit was not done and 1 means the edit was completed. Any edits that are not done (i.e. have a flag of 0) will be done at a later time.

Manual Edits							
Edit ID	Edit	Start	End	Hex ID	Comments	Flag	
72197	Edit	604292 (23:51:14)	604500 (23:54:42)	7ec1	zob High VPE/Ratio - Increase in SV range error. PRN10 range error -0.2m to 10.5m at 12.3 degrees.	1	
72112	Edit	555817 (10:23:19)	555877 (10:24:19)	89c1	mmx High VPE - PRN30 dropped from Nav solution at 6.1 degrees. Error increase on selected thread only.	1	
72113	Edit	524124 (01:35:06)	524250 (01:37:12)	76c1	zkc High VPE/Ratio - Increase in SV range error. PRN8 range error 0.3m to -4.7m at 11.8 degrees.	1	
72114	Edit	555878 (10:24:20)	555904 (10:24:46)	89c1	mmx High HPE - Picks up SV previously marked bad. PRN30 7.8m range error at 6.3 degrees.	1	
72115	Edit	558648 (11:10:30)	558750 (11:12:12)	7fc1	zse High HPE/Ratio - Increase in SV range error. PRN16 range error 1.5m to -7.4m at 7.5 degrees.	1	
72116	Edit	579500 (16:58:02)	579530 (16:58:32)	1370	Arcata LPV200 Outage - Receiver dropped SV from tracking, no corresponding loss of SV at airport.	1	
72117	Edit	566942 (13:28:44)	566990 (13:29:32)	0170	Atlantic City (0170) LPV200 Outage - Receiver dropped SV from tracking, no corresponding loss of SV at airport.	1	
72118	Edit	519765 (00:22:27)	519766 (00:22:28)	90c2	yfb LPV200 Outage - Local Iono, selected thread only.	1	
72119	Edit	584182 (18:16:04)	584184 (18:16:06)	8ac2	mpr LPV200 Outage due to selected thread having one less SV in the Nav solution than the other threads.	1	

When you click on the “Load Automatic Edits” button, you can view all the edits. Below is a partial table from the website. Listed in this table are: the receiver, time of week (TOW), Nav mode, number of satellites that were valid, the HPL, VPL, Flag and Geostationary satellite number. Here the number listed under Flag shows us how many satellites discarded from the solution. If VPL is > 50 or HPL is > 40, the data is automatically edited out of the statistics.

Auto Edits										
City	RCVR	Time	NAV	Sat Valid	HPL	VPL	Flag	Geo		
Atlantic City-G3B-L1L5	277	524821 (01:46:43)	3	5	133	55	6	138		
Atlantic City-G3B-L1L5	277	524822 (01:46:44)	3	5	130	55	6	138		
Atlantic City-G3B-L1L5	277	524823 (01:46:45)	3	5	131	55	6	138		
Atlantic City-G3B-L1L5	277	524824 (01:46:46)	3	5	131	55	6	138		
Atlantic City-G3B-L1L5	277	524825 (01:46:47)	3	5	131	55	6	138		
Atlantic City-G3B-L1L5	277	524826 (01:46:48)	3	5	132	55	6	138		